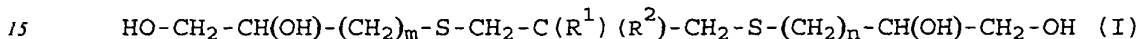


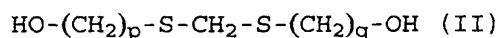
## WE CLAIM:

1. A layer configuration on a support, said layer configuration comprising a layer containing a polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a compound selected from the group consisting of polyphosphoric acids, polyphosphoric acid salts, thia-alkanedicarboxylic acids, cyclohexadiene compounds and polyhydroxy-compounds selected from the group consisting of tetronic acid derivatives; ortho-dihydroxybenzene compounds with at least one sulpho group, compounds according to formula (I):



wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m are independently 1, 2 or 3; compounds according to formula (II):

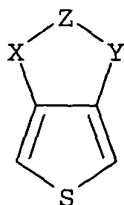
20



wherein p and q are independently 2, 3 or 4; compounds hydrolyzable to tetronic acid derivatives; compounds hydrolyzable to compounds according to formula (I); and sulpho-substituted 2-thia-alkyl-benzimidazole compounds.

2. Layer configuration according to claim 1, wherein said optionally substituted 3,4-alkylenedioxythiophene structural units are represented by formula (III):

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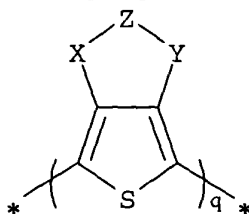


(III)

in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2)_n\text{-}$ ;  $R^3$  is hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18.

35

3. Layer configuration according to claim 1, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is a polythiophene according to formula (IV)

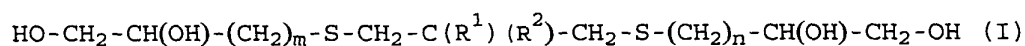


(IV)

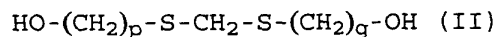
in which X and Y are O; Z is  $-(CH_2)_m-CR^3R^4-(CH_2)_n-$ ;  $R^3$  is hydrogen or  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $R^4$  is  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

4. Layer configuration according to claim 1, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].
5. Layer configuration according to claim 1, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxy-thiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxy-thiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.
6. Layer configuration according to claim 1, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly(3,4-ethylenedioxythiophene).
7. Layer configuration according to claim 1, wherein said layer further contains a polyanion.
8. Layer configuration according to claim 7, wherein said polyanion is poly(styrene sulphonate).
9. A light emitting diode consisting of a layer configuration on a support, said layer configuration comprising a layer containing

a polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a  
 5 compound selected from the group consisting of polyphosphoric acids, polyphosphoric acid salts, thia-alkanedicarboxylic acids, cyclohexadiene compounds and polyhydroxy-compounds selected from the group consisting of tetrionic acid derivatives; ortho-dihydroxybenzene compounds with at least one sulpho group,  
 10 compounds according to formula (I):

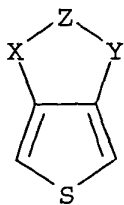


wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m  
 15 are independently 1, 2 or 3; compounds according to formula (II):



20 wherein p and q are independently 2, 3 or 4; compounds hydrolyzable to tetrionic acid derivatives; compounds hydrolyzable to compounds according to formula (I); and sulpho-substituted 2-thia-alkyl-benzimidazole compounds.

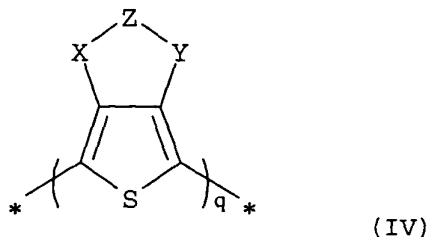
25 10. Light emitting diode according to claim 9, wherein said optionally substituted 3,4-alkylenedioxythiophene structural units are represented by formula (III):



(III)

30 in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2\text{)}_n\text{-}$ ;  $R^3$  is hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $\text{M}^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18.

11. Light emitting diode according to claim 9, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is a polythiophene according to formula (IV)



- 5 in which X and Y are O; Z is  $-(CH_2)_m-CR^3R^4-(CH_2)_n-$ ;  $R^3$  is hydrogen or  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $R^4$  is  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

10

12. Light emitting diode according to claim 9, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].

15

13. Light emitting diode according to claim 9, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxy-thiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxy-thiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.

20

- 25 14. Light emitting diode according to claim 9, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly(3,4-ethylenedioxythiophene).

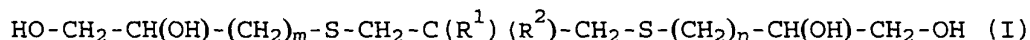
15. Light emitting diode according to claim 9, wherein said layer further contains a polyanion.

30

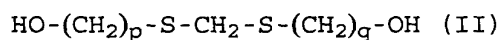
16. Light emitting diode according to claim 15, wherein said polyanion is poly(styrene sulphonate).

- 35 17. A photovoltaic device consisting of a layer configuration on a support, said layer configuration comprising a layer containing a polymer containing optionally substituted 3,4-

alkylenedioxythiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a compound selected from the group consisting of polyphosphoric acids, polyphosphoric acid salts, thia-alkanedicarboxylic acids, cyclohexadiene compounds and polyhydroxy-compounds selected from the group consisting of tetrionic acid derivatives; ortho-dihydroxybenzene compounds with at least one sulpho group, compounds according to formula (I):



wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m are independently 1, 2 or 3; compounds according to formula (II):



wherein p and q are independently 2, 3 or 4; compounds hydrolyzable to tetrionic acid derivatives; compounds hydrolyzable to compounds according to formula (I); and sulpho-substituted 2-thia-alkyl-benzimidazole compounds.

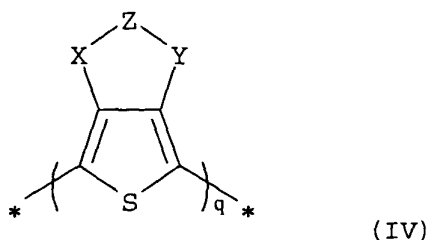
18. Photovoltaic device according to claim 17, wherein said optionally substituted 3,4-alkylenedioxythiophene structural units are represented by formula (III):



(III)

in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2\text{)}_n\text{-}$ ;  $R^3$  is hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $\text{M}^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18.

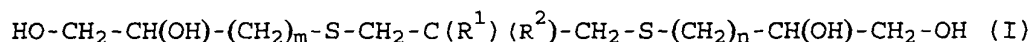
19. Photovoltaic device according to claim 17, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is a polythiophene according to formula (IV)



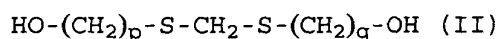
in which X and Y are O; Z is  $-(CH_2)_m-CR^3R^4-(CH_2)_n-$ ;  $R^3$  is hydrogen or  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $R^4$  is  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

20. Photovoltaic device according to claim 17, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].
21. Photovoltaic device according to claim 17, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxy-thiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxy-thiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.
22. Photovoltaic device according to claim 17, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly(3,4-ethylenedioxythiophene).
23. Photovoltaic device according to claim 17, wherein said layer further contains a polyanion.
24. Photovoltaic device according to claim 23, wherein said polyanion is poly(styrene sulphonate).
25. A solar cell consisting of a layer configuration on a support, said layer configuration comprising a layer containing a polymer containing optionally substituted 3,4-alkylenedioxy-thiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a compound selected

from the group consisting of polyphosphoric acids,  
polyphosphoric acid salts, thia-alkanedicarboxylic acids,  
cyclohexadiene compounds and polyhydroxy-compounds selected from  
the group consisting of tetrionic acid derivatives; ortho-  
5 dihydroxybenzene compounds with at least one sulpho group,  
compounds according to formula (I):



10 wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m  
are independently 1, 2 or 3; compounds according to formula  
(II):



15 wherein p and q are independently 2, 3 or 4; compounds  
hydrolyzable to tetrionic acid derivatives; compounds  
hydrolyzable to compounds according to formula (I); and sulpho-  
substituted 2-thia-alkyl-benzimidazole compounds.

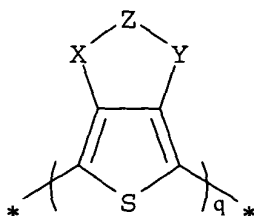
- 20 26. Solar cell according to claim 25, wherein said optionally  
substituted 3,4-alkylenedioxythiophene structural units are  
represented by formula (III):



(III)

25 in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2)_n\text{-}$ ;  $R^3$  is  
hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  
 $M^+$  is a cation; m and n are independently a whole number from 0  
to 3; s is a whole number from 0 to 10; and p is a whole number  
30 from 1 to 18.

27. Solar cell according to claim 25, wherein said polymer  
containing optionally substituted 3,4-alkylenedioxythiophene  
structural units is a polythiophene according to formula (IV)



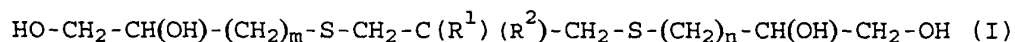
(IV)

in which X and Y are O; Z is  $-(\text{CH}_2)_m-\text{CR}^3\text{R}^4-(\text{CH}_2)_n-$ ;  $\text{R}^3$  is hydrogen or  $-(\text{CH}_2)_s-\text{O}-(\text{CH}_2)_p-\text{SO}_3^-\text{M}^+$ ;  $\text{R}^4$  is  $-(\text{CH}_2)_s-\text{O}-(\text{CH}_2)_p-\text{SO}_3^-\text{M}^+$ ;  $\text{M}^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

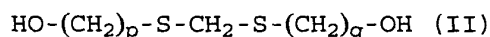
28. Solar cell according to claim 25, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].
29. Solar cell according to claim 25, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxythiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxythiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.
30. Solar cell according to claim 25, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly(3,4-ethylenedioxythiophene).
31. Solar cell according to claim 25, wherein said layer further contains a polyanion.
32. Solar cell according to claim 31, wherein said polyanion is poly(styrene sulphonate).
33. A transistor consisting of a layer configuration on a support, said layer configuration comprising a layer containing a polymer containing optionally substituted 3,4-alkylenedioxy-thiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a compound selected



from the group consisting of polyphosphoric acids, polyphosphoric acid salts, thia-alkanedicarboxylic acids, cyclohexadiene compounds and polyhydroxy-compounds selected from the group consisting of tetrionic acid derivatives; ortho-  
 5 dihydroxybenzene compounds with at least one sulpho group, compounds according to formula (I):



10 wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m are independently 1, 2 or 3; compounds according to formula (II):



15 wherein p and q are independently 2, 3 or 4; compounds hydrolyzable to tetrionic acid derivatives; compounds hydrolyzable to compounds according to formula (I); and sulpho-substituted 2-thia-alkyl-benzimidazole compounds.

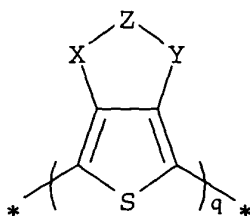
20 34. Transistor according to claim 33, wherein said optionally substituted 3,4-alkylenedioxythiophene structural units are represented by formula (III):



(III)

25 in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2\text{)}_n\text{-}$ ;  $R^3$  is hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2\text{)}_p\text{-SO}_3^-\text{M}^+$ ;  $\text{M}^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number  
 30 from 1 to 18.

35. Transistor according to claim 33, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is a polythiophene according to formula (IV)



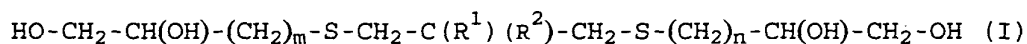
(IV)

in which X and Y are O; Z is  $-(CH_2)_m-CR^3R^4-(CH_2)_n-$ ;  $R^3$  is hydrogen or  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $R^4$  is  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

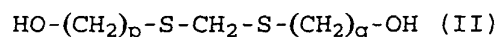
36. Transistor according to claim 33, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].
37. Transistor according to claim 33, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxythiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxythiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.
38. Transistor according to claim 33, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is poly(3,4-ethylenedioxythiophene).
39. Transistor according to claim 33, wherein said layer further contains a polyanion.
40. Transistor according to claim 39, wherein said polyanion is poly(styrene sulphonate).
41. An electroluminescent device consisting of a layer configuration on a support, said layer configuration comprising a layer containing a polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units, in which said two alkoxy groups may be the same or different or together represent an optionally substituted oxy-alkylene-oxy bridge, and a

compound selected from the group consisting of polyphosphoric acids, polyphosphoric acid salts, thia-alkanedicarboxylic acids, cyclohexadiene compounds and polyhydroxy-compounds selected from the group consisting of tetrionic acid derivatives; ortho-

5 dihydroxybenzene compounds with at least one sulpho group, compounds according to formula (I):



10 wherein  $R^1$  and  $R^2$  are independently H, -OH or alkyl, and n and m are independently 1, 2 or 3; compounds according to formula (II):



15 wherein p and q are independently 2, 3 or 4; compounds hydrolyzable to tetrionic acid derivatives; compounds hydrolyzable to compounds according to formula (I); and sulpho-substituted 2-thia-alkyl-benzimidazole compounds.

- 20 42. Electroluminescent device according to claim 41, wherein said optionally substituted 3,4-alkylenedioxythiophene structural units are represented by formula (III):

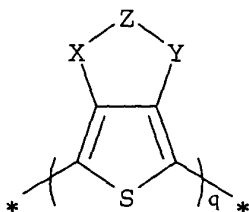


(III)

25 in which X and Y are O, Z is  $-(\text{CH}_2)_m\text{-CR}^3\text{R}^4\text{-(CH}_2)_n\text{-}$ ;  $R^3$  is hydrogen or  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  $R^4$  is  $-(\text{CH}_2)_s\text{-O-(CH}_2)_p\text{-SO}_3^-\text{M}^+$ ;  $\text{M}^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number

30 from 1 to 18.

43. Electroluminescent device according to claim 41, wherein said polymer containing optionally substituted 3,4-alkylenedioxythiophene structural units is a polythiophene
- 35 according to formula (IV)



(IV)

in which X and Y are O; Z is  $-(CH_2)_m-CR^3R^4-(CH_2)_n-$ ;  $R^3$  is hydrogen or  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $R^4$  is  $-(CH_2)_s-O-(CH_2)_p-SO_3^-M^+$ ;  $M^+$  is a cation; m and n are independently a whole number from 0 to 3; s is a whole number from 0 to 10; and p is a whole number from 1 to 18; and q is a whole number from 2 to 10,000.

44. Electroluminescent device according to claim 41, wherein said polymer containing optionally substituted 3,4-alkylenedioxy-thiophene structural units is poly[4-(2,3-dihydro-thieno[3,4-b][1,4]dioxin-2-ylmethoxy)-butane-1-sulphonic acid].
45. Electroluminescent device according to claim 41, wherein said polymer is selected from the group consisting of: poly(3,4-methylenedioxy-thiophene), poly(3,4-methylenedioxythiophene) derivatives, poly(3,4-ethylenedioxythiophene), poly(3,4-ethylenedioxythiophene) derivatives, poly(3,4-propylenedioxythiophene), poly(3,4-propylenedioxythiophene) derivatives, poly(3,4-butylenedioxythiophene), poly(3,4-butylenedioxythiophene) derivatives and copolymers therewith.
46. Electroluminescent device according to claim 41, wherein said polymer containing optionally substituted 3,4-alkylenedioxy-thiophene structural units is poly(3,4-ethylenedioxy-thiophene).
47. Electroluminescent device according to claim 41, wherein said layer further contains a polyanion.
48. Electroluminescent device according to claim 47, wherein said polyanion is poly(styrene sulphonate).